

FQ5-509

64

## CLAIMS:

1. A base station apparatus for communicating with a specific base station and at least one terminal that is movable relative to the specific base station, wherein

the base station apparatus is movable relative to the specific base station, and when the at least one terminal has moved relative to the specific base station, the base station apparatus moves relative to the specific base station substantially in the same direction as a move direction of the at least one terminal.

2. The base station apparatus according to claim 1, wherein the base station apparatus communicates with the specific base station and the terminal respectively according to an ATM (asynchronous transfer mode) communication system in which user data and control information are allocated to at least one ATM cell without distinction between the user data and the control information.

3. The base station apparatus according to claim 2, wherein

the user data is data that is transmitted through a traffic channel, and

the control information is information that is

FQ5-509

65

transmitted through a control channel.

4. The base station apparatus according to claim 2, wherein, when the base station apparatus communicates with the specific base station and the terminal, respectively, unique  
5 VPI (virtual path identifier) and VCI (virtual channel identifier) are allocated to the at least one ATM cell that includes the control information, the VPI and VCI indicating that the at least one ATM cell includes the control information.

5. The base station apparatus according to claim 2,  
10 comprising:

a specific base station interface section for performing radio communication with the specific base station, wherein the specific base station interface section produces a used-channel reception status signal that indicates a  
15 reception status of a channel that is being used between the specific base station and the base station apparatus and an unused-channel reception status signal that indicates a reception status of a second channel different from the channel that is being used; and

20 a base station control section determines whether a hand-over is to be carried out or not, based on the used-channel reception status signal and the unused-channel reception status signal which are input from the specific base station interface section, wherein, when it is determined that

FQ5-509

66

the hand-over is to be carried out, the base station control section selects a service area to which the hand-over is to be carried out.

6. The base station apparatus according to claim 5,

5 further comprising:

a terminal interface section;  
a VPI conversion section; and  
a VPI database section for storing VPI data,  
wherein

10 the specific base station interface section  
extracts an ATM cell as a first ATM cell from a reception frame  
received from the specific base station, outputs the first ATM  
cell to the VPI conversion section, maps an ATM cell input from  
the VPI conversion section into a transmission frame as a second  
15 ATM cell, and transmits the transmission frame to the specific  
base station,

the terminal interface section communicates with  
the terminal, extracts an ATM cell as a third ATM cell from a  
reception frame received from the terminal, outputs the third  
20 ATM cell to the VPI conversion section, maps an ATM cell input  
from the VPI conversion section into a transmission frame as  
a fourth ATM cell, and transmits the transmission frame to the  
terminal,

the VPI conversion section refers to the VPI data  
25 stored in the VPI database, converts the VPI data of the input

FQ5-509

67

first ATM cell and outputs a result to the terminal interface section, converts the VPI data of the input third ATM cell and outputs a result to the fixed base station interface section, and

5                   the mobile base station control section outputs the converted VPI data to the VPI database.

7.       The base station apparatus according to claim 1, wherein, when the terminal moves from a first service area to a second service area of the specific base station, the base station apparatus carries out hand-over processing of the terminal on behalf of the terminal.

8.       The base station apparatus according to claim 1, wherein the base station apparatus communicates with a plurality of specific base stations and, when the terminal moves from a first service area of a first specific base station among the plurality of specific base stations to a second service area of a second specific base station among the plurality of specific base stations, the base station apparatus carries out a hand-over processing of the terminal on behalf of the terminal.

9.       The base station apparatus according to claim 7, wherein, when a plurality of terminals move from the first service area to the second service area, the base station

FQ5-509

68

apparatus carries out hand-over processing of the plurality of terminals as one unit.

10. The base station apparatus according to claim 1,  
wherein the base station apparatus is installed in transporting  
5 means for transporting a user of a terminal.

11. The base station apparatus according to claim 1,  
wherein the specific base station is fixedly provided on the  
ground.

12. A communication system comprising:  
10 a specific base station;  
a terminal that is movable relative to the specific  
base station; and

a base station apparatus for communicating with the  
specific base station and the terminal, wherein  
15 the base station apparatus is movable relative to  
the specific base station, and when the terminal has moved  
relative to the specific base station, the base station  
apparatus moves relative to the specific base station  
substantially in the same direction as a move direction of the  
20 terminal.

13. The communication system according to claim 12,  
wherein the base station apparatus communicates with the

FQ5-509

69

specific base station and the terminal respectively according to an ATM (asynchronous transfer mode) communication system in which user data and control information are allocated to ATM cells without distinction between the user data and the control  
5 information.

14. The communication system according to claim 13, wherein, when the base station apparatus communicates with the specific base station and the terminal, respectively, unique VPI and VCI are allocated to the ATM cells that include the  
10 control information, the VPI and VCI indicating that the ATM cells include the control information.

15. The communication system according to claim 13, wherein the base station apparatus comprises:

a specific base station interface section; and  
15 a base station control section,

wherein the specific base station interface section carries out a radio communication with the specific base station, generates a used-channel reception status signal that indicates a reception status of a channel that is being used  
20 between the specific base station and the base station apparatus and an unused-channel reception status signal that indicates a reception status of a second channel different from the channel that is being used, and outputs these signals to the base station control section, and

FQ5-509

70

the base station control section determines whether a hand-over is to be carried out or not, based on the used-channel reception status signal and the unused-channel reception status signal, and selects a service area to which the hand-over is to be carried out when it is determined that the hand-over is to be carried out.

16. The communication system according to claim 15, wherein the base station apparatus further comprises:

a terminal interface section;

a VPI conversion section; and

a VPI database section for storing VPI data,

wherein the specific base station interface section extracts ATM cells from a reception frame received from the specific base station as first ATM cells, outputs the first ATM cells to the VPI conversion section, maps ATM cells input from the VPI conversion section into a transmission frame as second ATM cells, and transmits the transmission frame to the specific base station,

the terminal interface section communicates with the terminal, extracts ATM cells from a reception frame received from the terminal as third ATM cells, outputs the third ATM cells to the VPI conversion section, maps ATM cells input from the VPI conversion section into a transmission frame as fourth ATM cells, and transmits the transmission frame to the terminal,

the VPI conversion section refers to the VPI data

FQ5-509

71

stored in the VPI database section, converts the VPI data of the input first ATM cells and outputs a result to the terminal interface section, converts the VPI data of the input third ATM cells and outputs a result to the fixed base station interface section, and

the mobile base station control section outputs the converted VPI data to the VPI database section.

17. The communication system according to claim 12, wherein, when the terminal moves from a first service area to a second service area of the specific base station, the base station apparatus carries out a hand-over processing of the terminal on behalf of the terminal.

18. The communication system according to claim 12, wherein the base station apparatus communicates with a plurality of specific base stations and, when the terminal moves from a first service area of a first specific base station among the plurality of specific base stations to a second service area of a second specific base station among the plurality of specific base stations, the base station apparatus carries out a hand-over processing of the terminal on behalf of the terminal.

19. The communication system according to claim 12, wherein, when a plurality of terminals move from the first

FQ5-509

72

service area to the second service area, the base station apparatus collectively carries out a hand-over processing of the plurality of terminals as one unit.

20. The communication system according to claim 12,  
5 wherein the base station apparatus is installed in transporting means that transports a user of the terminal.

21. The communication system according to claim 12,  
wherein the specific base station is fixedly provided on the ground or is fixed relative to the ground surface.

10 22. A communication method comprising the steps of:  
(a) providing first and second service areas by a first base station;

(b) providing a second base station having a third service area;

15 (c) providing the second base station so that the third service area is superimposed on the first service area;

(d) when a plurality of terminals move from the first service area to the second service area, moving the second base station so that the third service area covers the moved  
20 plurality of terminals;

at the second base station,

(e) collectively generating first data required for a hand-over processing associated with movement of the

FQ5-509

73

plurality of terminals from the first service area to the second service area, on behalf of the plurality of terminals, to output the generated first data to the first base station; and

at the first base station,

- 5 (f) collectively generating for the plurality of terminals second data necessary for the hand-over processing of the plurality of terminals in response to the input first data to output the generated second data to the second base station.

- 10 23. The communication method according to claim 22, wherein

at step (e), the second base station outputs the generated first data in ATM (asynchronous transfer mode), and

- 15 at step (f), the first base station outputs the generated second data to the second base station in the ATM.

24. The communication method according to claim 22, wherein the hand-over processing is carried out only between the first terminal and the second terminal on behalf of the plurality of terminals.

- 20 25. The base station apparatus according to claim 2, wherein, when the terminal moves from a first service area to a second service area of the specific base station, the base station apparatus carries out hand-over processing of the

FQ5-509

74

terminal on behalf of the terminal.

26. The base station apparatus according to claim 2, wherein the base station apparatus communicates with a plurality of specific base stations and, when the terminal moves  
5 from a first service area of a first specific base station among the plurality of specific base stations to a second service area of a second specific base station among the plurality of specific base stations, the base station apparatus carries out a hand-over processing of the terminal on behalf of the  
10 terminal.

27. The base station apparatus according to claim 7, wherein the base station apparatus communicates with a plurality of specific base stations and, when the terminal moves  
15 from a first service area of a first specific base station among the plurality of specific base stations to a second service area of a second specific base station among the plurality of specific base stations, the base station apparatus carries out a hand-over processing of the terminal on behalf of the terminal.

20 28. The base station apparatus according to claim 8, wherein, when a plurality of terminals move from the first service area to the second service area, the base station apparatus carries out hand-over processing of the plurality of

FQ5-509

75

terminals as one unit.

29. The base station apparatus according to claim 1, wherein the specific base station is fixed relative to the ground surface.

5 30. The communication system according to claim 13, wherein, when the terminal moves from a first service area to a second service area of the specific base station, the base station apparatus carries out a hand-over processing of the terminal on behalf of the terminal.

10 31. The communication system according to claim 13, wherein the base station apparatus communicates with a plurality of specific base stations and, when the terminal moves from a first service area of a first specific base station among the plurality of specific base stations to a second service area  
15 of a second specific base station among the plurality of specific base stations, the base station apparatus carries out a hand-over processing of the terminal on behalf of the terminal.

20 32. The communication system according to claim 17, wherein the base station apparatus communicates with a plurality of specific base stations and, when the terminal moves from a first service area of a first specific base station among

FQ5-509

76

the plurality of specific base stations to a second service area of a second specific base station among the plurality of specific base stations, the base station apparatus carries out a hand-over processing of the terminal on behalf of the

5 terminal.

33. The communication system according to claim 13, wherein, when a plurality of terminals move from the first service area to the second service area, the base station apparatus collectively carries out a hand-over processing of

10 the plurality of terminals as one unit.

34. The communication system according to claim 12, wherein the specific base station is fixed relative to the ground surface.